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ABSTRACT

Effects of teacher-pupil ratio on kindergartners' mastery of reading readiness objectives were studied. The study was part of Tennessee's Project STAR, a 4-year study of class size. About 2,850 students in 38 elementary schools that served 4 types of communities: innercity, suburban, urban, and rural, in 26 Tennessee school systems participated. Basic reading skills objectives were divided into three strands: word identification skills, comprehension skills, and reference and study skills. There were three categories of classes: small, regular, or regular with full-time teacher aide. Data were collected from individual or group profiles indicating mastery or nonmastery of objectives tested. Data were analyzed with a five-way analysis of variance and a cross-tabulation procedure with a chi-square test of significance. Findings suggested that class size was a significant factor in kindergarten reading readiness achievement. Small classes achieved greater mastery on 25 Basic Skills First objectives and 20 comprehension objectives, but not on 5-word identification objectives. Students who did not receive free lunches outscored students who received free or reduced cost lunches in every comparison. Innercity students obtained the lowest scores of the four geographic localities. Students in the lowest attendance category obtained the lowest average scores in each of the three class size conditions. (RH)

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Project STAR Research Synopsis

The Effect of Reduced Class-Size on Kindergarten Reading Readiness

Helen Pate Bain and Roseanne Jacobs

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This study was a component of Tennessee's Project, Student Teacher Achievement Ratio (STAR) a four year longitudinal research study of class size. In the Spring of 1984, the Tennessee State Legislature adopted a comprehensive education reform program called the Better Schools Program. Although the media gave the teacher career ladder plan the most attention, the Tennessee Centers for Excellence program provided higher education a vehicle to work on the improvement of education in Tennessee. The Tennessee State University (TSU) Center of Excellence for Research in Basic Skills for the Economically and Educationally Disadvantaged began a modest program on the effects of reduced class-size in one Metropolitan Nashville school. With the first year results of the Metropolitan Nashville study providing significant positive gains researchers were encouraged to expand the scope of the research. The director of that project, Dr. Helen Pate Bain, encouraged the legislature to adopt a reduced class-size program statewide. One approach for what could be done in Tennessee was a program in Indiana, Project Prime Time, which studied reduced class size in grades K-2.

In the spring of 1985, information about the Indiana program and the TSU studies was shared with the Tennessee State Board of Education Chairman and staff and with the members of the House and Senate Education Committees. Steve Cobb, then member of the Tennessee House of Representative, became interested in the issue of the optimum class size in the early elementary grades. The literature, particularly the Glass Meta-Analysis, suggested that class size must be reduced to about 15 to 1 to have much effect on pupil achievement. Glass' analysis had been criticized because the type of school and the student characteristics in some of the small

classes examined were not representative of the average public school and public school student. Because the research results are not conclusive, and because the cost of a major reduction on class size would be very large, Representative Cobb wanted the state to conduct a well-designed study of class size before investing in a costly new program. This led to House Bill 544 and an appropriation of $12 million for the four year study.

The project began in the 1985-86 school year and followed the same students from kindergarten through the third grade. The legislation required that each participating school have at least three or more classes; at least one small class with 13 to 17 students, one regular class of 22 to 25 students, and one regular class plus a full-time teacher aide with 22 to 25 students. Larger schools had several classes of each condition. In order to have the required within-school design, a school had to have at least 57 kindergarten students. The teachers and students were randomly assigned to class conditions by the Department of Education. A student in a small class in kindergarten would stay in the small class for grades one, two, and three so the cumulative effect of the class type could be measured.

The sample of this study was determined by Basic Skills First (BSF) records submitted by kindergarten teachers involved in the first year of Project STAR. Approximately 2,850 students in 38 elementary schools that serve inner-city, suburban, urban, and rural communities in 26 Tennessee school systems participated. There were 51 Small, 49 Regular, and 40 Regular + Aide classes. The data which was gathered in the 1985-86 school year consisted of the Tennessee Kindergarten BSF reading readiness objectives collected from kindergarten STAR classes. The Tennessee Basic Skills First Program is a component of the Comprehensive Education Reform Act which mandated Tennessee school systems could either utilize the state BSF Program or develop a comparable program to identify mastery of basic skills by students. Only the Project STAR schools using the Tennessee BSF Kindergarten skill objectives were included. In 1985-86 there were 74 identified reading readiness objectives for kindergarten, and

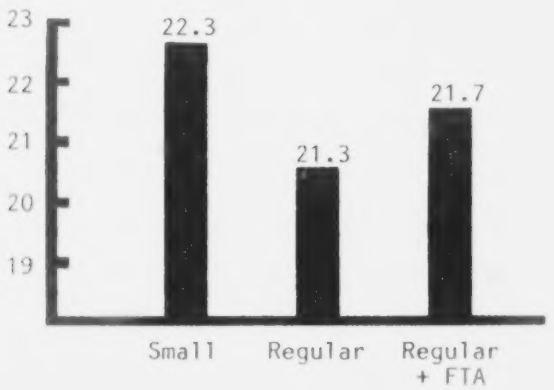
25 of these were tested objectives. Tests were designed by the state to identify mastery of the objectives. Documentation of objectives mastered was recorded by the teacher for individual students. The basic skills reading objectives were divided into three strands: word identification skills, comprehension skills, and reference and study skills.

The data was collected from individual or group profiles of kindergarten students involved in Project STAR. The profiles indicated mastery or non-mastery of the objectives tested. Also analyzed were demographic data, including sex, attendance, and socioeconomic status (SES). The SES refers to whether or not a child received free or reduced lunch. The schools were identified as inner-city, suburban, urban, or rural by population of the community. Attendance was recorded through the eighth attendance period as reported to state education department.

The data was analyzed using a five-way analysis of variance and a crosstabulation procedure with a chi-square test of significance. A statistically significant difference was found between the small classes and both regular and regular + aide classes, and the total 25 tested Basic Skills First objectives at .01 level. The small classes mastered one more objective that the regular classes and 0.6 more of an objective than the regular + aide classes (Figure 1).

Figure 1

The Average Number of BSF Objectives Mastered by Class Type



The regular classes were found to be least effective in achievement readiness. The same significant relationship (.01 level) was found in the subcategory of 20 reading comprehension skills (Figure 2). In the reading comprehension skills there 1,171 students on free or reduced lunch and 1,255 students in the non-free lunch category. The mean score in this content area for the free or reduced lunch students was 16.0 and 18.5 for the non-free lunch students. This 2.5 difference in the mean number of objectives mastered was one of the largest found in the study. No significant relationship was found between small classes, regular classes, and regular + aide classes on the mastery of the five word identification skills (Figure 3).

Figure 2

The Average Number of Comprehension Objectives Mastered by Class Type

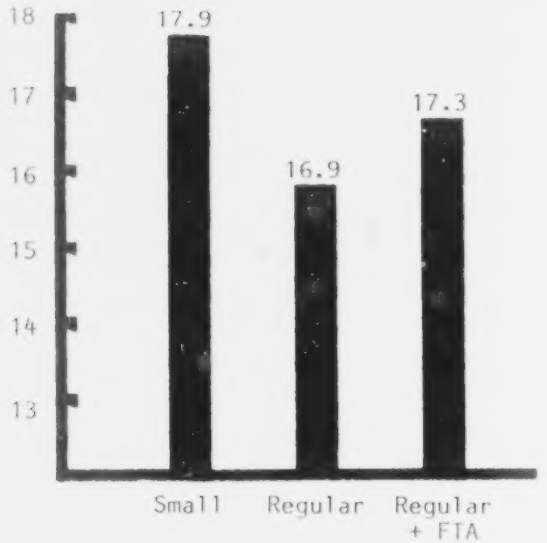


Figure 3

The Average Number of Word Identification Objectives Mastered by Class Type

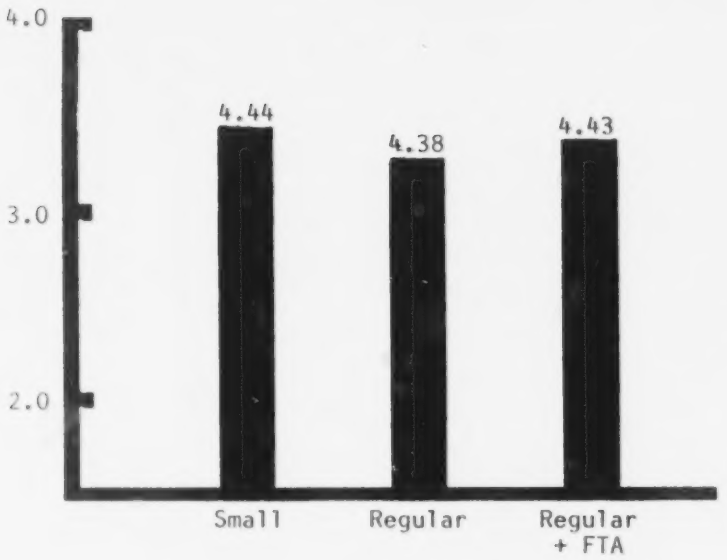


Figure 4 displays a statistically significant interaction at the .01 level among the three class types and the four geographic localities ($F = 6.56$, $p = .000$). Suburban and rural students achieved higher than inner city and urban students. Free/reduced students achieved highest in the small classes and lowest in the regular classes (Figure 5). Students achieve better in all three types of class conditions when they are present over 90 percent of the time. Students in small classes who attended 90 percent of the time showed the greatest gain (Figure 6).

Figure 4

The Average Number of Comprehension Objectives Mastered by Class Type

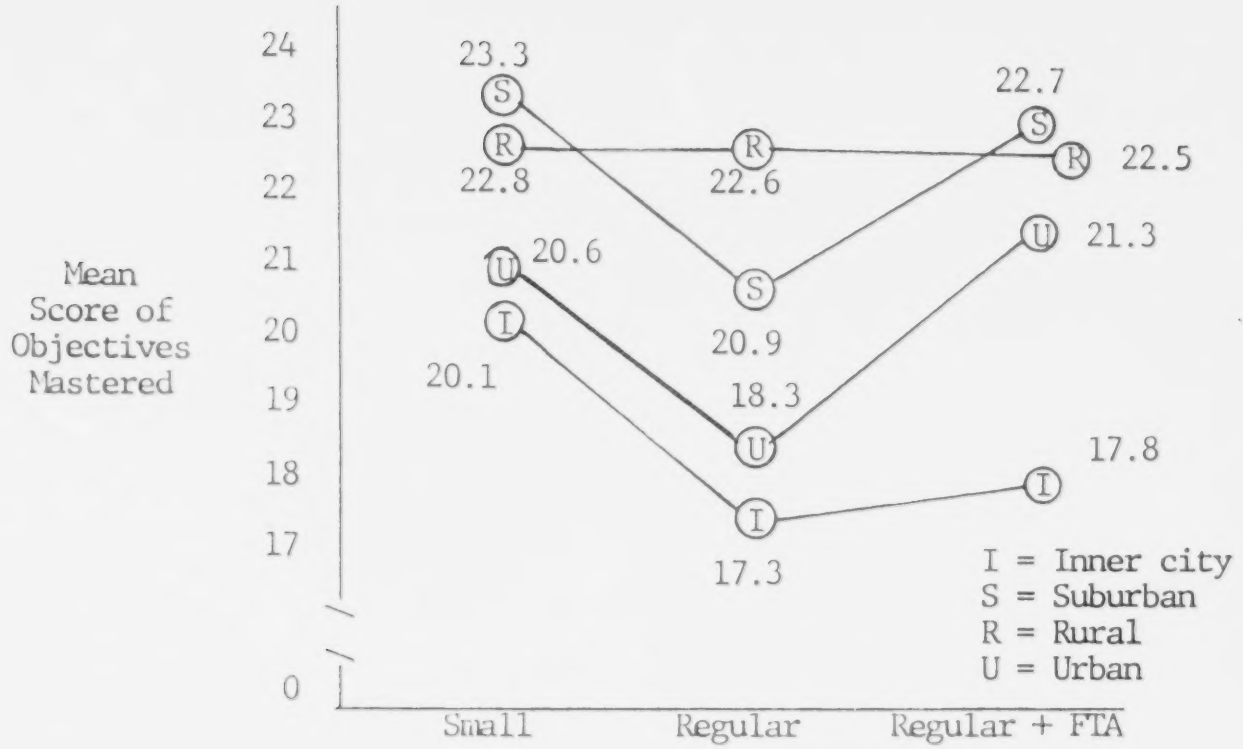


Figure 5

The Average Number of Comprehension Objectives Mastered by Class Type

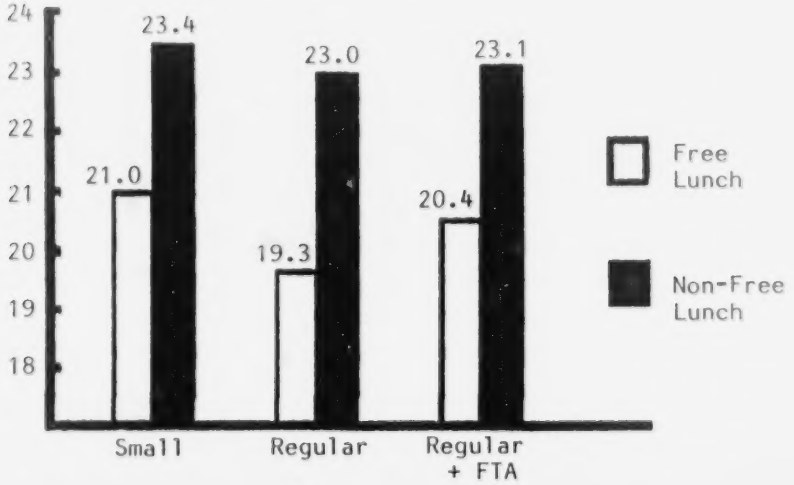
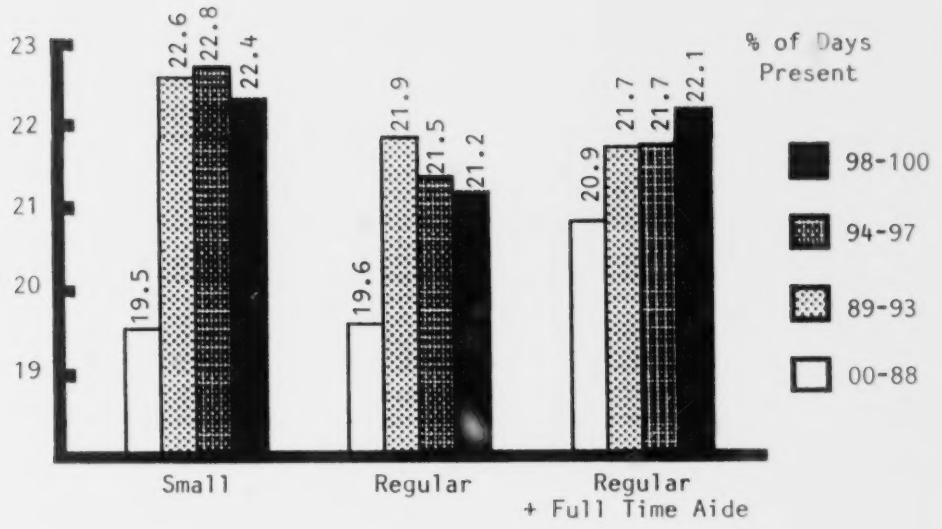


Figure 6

The Average Number of Comprehension Objectives Mastered by Class Type



A statistically significant relationship was found between sex, socioeconomic status, geographic localities, and achievement in the total 25 Basic Skills First objectives and the subcategories of comprehension and word identification. The lowest mean scores on the 25 total Basic Skills First objectives and the 20 Comprehension skills were made by males, students on free/reduced lunch, and inner-city student in the regular classes. The highest scores made by at-risk students, i.e., males, free/reduced lunch, inner-city students, were in the small classes. The most detrimental classes for these at-risk students were the regular classes, and the small classes were the most beneficial to these and all kindergarten students.

From the findings of this study, it was concluded that class size is a significant factor in kindergarten reading readiness achievement with the small classes achieving greater mastery on the 25 total Basic Skills First objectives and the 20 comprehension objectives, but not on the five

word identification objectives. This can possibly be explained by the skills identified in the word identification objectives. These included: identify name, identify first and last name; match word with word cards; selecting matching letters or words; name upper and lower cases letters. If any reading readiness objectives were taught before the students entered kindergarten, these are probably the skills the students would have mastered. Also, since these are lower level thinking skills, large group instruction rather than small group or individualized instruction probably could produce mastery of these skills, which can be taught in the regular sized classes as well as in the small classes. Since the comprehension skills are the largest portion of the reading readiness skills necessary for a student to begin formal reading, the size of the class becomes an important factor. Even though having a full-time aide provided some achievement gains, the gains were not as great as in the small classes. A school system should receive a greater return for its investment if it reduces class-size instead of hiring full-time teacher aides.

The non-free lunch students outscored the free or reduced lunch students in every comparison. Some of the greatest differences in scores was found between the two socioecomic categories. The lowest average scores were recorded for free or reduced lunch students in the regular classes, while the highest average scores for free or reduced lunch students was found in the small classes. From these results, it was concluded that free or reduced lunch students were one of the greatest groups at-risk of failure and need more of the teacher's time in kindergarten for reteaching and reinforcing skills. Students on free or reduced lunch clearly received some of the greatest returns from the educational investment when they were in classes with a 15 to 1 ratio so the teachers could provide more individual and small group instruction.

Inner-city students obtained the lowest average scores of the four geographic localities, and their lowest scores were in the regular class setting. The highest scores for inner-city students were obtained in the small classes. This indicates that small class-size is also one of the most essential elements needed by inner-city student for mastery of reading readiness objectives.

Students on the lowest attendance category obtained the lowest average scores on each of the three class conditions. Neither the small class nor the other two class conditions proved beneficial when students attendance was in the lowest category. It was concluded that very low attendance was so detrimental to student achievement that small class-size could not provide the reinforcement necessary for mastery of reading readiness skills. The academic benefits which come from high attendance can be achieved when teachers of small classes establish closer contact with the homes and thereby help insure high attendance.

Bases on the findings and conclusions of this study, the following recommendations were made:

1. Kindergarten attendance should be mandatory.
2. The pupil - teacher ratio should be 15 to 1 for kindergarten students.
3. Staff development for kindergarten teachers should include: (a) appropriate instructional techniques for small or individualized instruction, (b) in-depth understanding and knowledge of child development and appropriate activities to strengthen the developmental weaknesses of at-risk students, and (c) early childhood guidance training so that every kindergarten teacher will become a guidance counselor.
4. Home visits should be made to establish a closer relationship with parents. Teachers could share activities with parents on a one - to - one basis in order to reinforce needed reading readiness skills. These visits could also hopefully strengthen the importance of attendance and improve the overall community-school involvement..

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For more information on this sub-study or the main
Project STAR class-size research contact:

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